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“The three legged stool of music value: hertzian siriusxm spotify”

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THE THREE-LEGGED STOOL OF MUSIC VALUE: HERTZIAN RADIO, SIRIUSXM, SPOTIFY

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Abstract

Pricing copyrighted works or assets has always been a difficult task given the information good character of such works. Doing it in the digital era is even more challenging. This paper proposes an approach to infer the respective competitive market value of copyrights in music from choices made by operators of Hertzian radio, satellite radio (SiriusXM), and interactive music streaming services (Spotify). Although the inferred music values are rather similar, they need not be equal or even close as business models and cost structures differ significantly between those music delivery technologies. Nevertheless the results suggest that rightsholders are significantly shortchanged and poorly served by the current copyright pricing framework.

Keywords Copyright, Copyright value, Hertzian radio, SiriusXM, Spotify.

INTRODUCTION

Three principles are at the forefront of the copyright pricing challenge: First, the competitive level playing field principle, which ensures that all uses of musical works and sound recordings, whether in hard or digital form, compete for customers on equal terms given the various business models characterizing the different users: same pricing for similar uses, different but compatible pricing for different uses; Second, the competitive market value principle, which ensures that the compensation of rightsholders achieve fairness for both users and rightsholders as well as efficiency and effectiveness; Third, the information good pricing principle, which ensures that users can have access to if not consume all available musical works given that those musical works are permanent, that is, not expended in consumption.

The competitive pricing of copyrights in such a context aims to achieve both balance and neutrality between rightsholders' rights and users' rights, both business users' rights and consumers' rights, through the *proper* compensation of creators for the valuable assets they create, the *proper* compensation of business users for the costs and risks they incur, and the *proper* if not maximal dissemination of musical creations. Achieving such competitive pricing requires to move away from traditional heuristics toward sounder analytics.

Indeed, the current procedures for determining royalty payments and rates are based mainly if not totally on path-dependent heuristics and rules of thumb whose foundations in theoretical and applied economics are relatively weak and clearly inadequate to tackle the current and upcoming copyright agenda.

The fundamental issues or questions before us are the following:

- a) What is or are the competitive market value/values of copyright given the “information good” aspect of copyrighted works (music and books), as the advent of digitization makes the emergence of properly functioning competitive markets difficult, even impossible?
- b) How to balance the creators' right to a fair compensation and the users' right to the benefits of digital technologies, at a time when the conflict between fairness and efficiency has become more acute than ever before?

A consumers' advocate economist would claim: Although we value music a lot and want to consume more of it and although we want providers of such music to be properly compensated (competitive market compensation), the pricing of such music should take into account the fact that music is an information good or asset and the fact that the addition of more consumers and an enhanced dissemination of works cost almost nothing.

This calls for a significant reassessment of both the way copyright protection has historically been understood and enforced and the channels through which creators' proper or fair compensation can be achieved. This is at best a difficult multifaceted endeavor, whose end point solution likely lies outside the box.

According to Nielsen Music360 Report (2015),¹ Americans streamed 135 billion tracks in the first half of 2015, an increase of more than 90% from the first half of 2014. However, only 9% of them expect or are likely to subscribe or pay for streaming music in the next 6 months. One may wonder why the vast majority of people are thus refusing to put their hand in their pocket to have access to (almost) all the music in the world.² It is interesting to note that although online streaming is increasing rapidly, about 60% of respondents say they rely on radio, Hertzian or satellite, to find out about new music.

As the debate on the re-examination of copyright legal foundations and enforcement, coverage, exceptions, and compensation takes place, the market or markets of music delivery are changing rapidly.

In a Report released in March 2017, the Phoenix Center claims that:³ “In 1999, the year the Digital Millennium Copyright Act (“DMCA”) was enacted, revenues for the recording industry in the United States reached nearly \$21 billion (in current dollars), growing nearly 5% annually over the preceding decade. The future looked bright. Fifteen years later, due in large part to digital piracy made possible by technology and high-speed Internet connections, sales were only \$7 billion, a decline of 65% in real terms.”

According to the Recording Industry Association of America (RIAA)⁴ “Although our 2016 revenue report catalogues substantial overall improvement for the industry, revenues [7.7 billion US \$] are still only about half what they were in 1999, and revenues from more traditional unit-based sales (physical products and digital downloads) continued to decline significantly ... [The] streaming music platforms generated the majority [51%, with Digital Downloads and Ringtones 24.1% and Physical sales 21.8%] of the U.S. music industry’s revenues. The streaming category includes revenues from subscription services (such as paid versions of Spotify, TIDAL, and Apple Music), streaming radio services including those revenues distributed by SoundExchange (like Pandora, SiriusXM, and other Internet radio), and ad-supported on-demand streaming services (such as YouTube, Vevo, and ad-supported Spotify) ... In 2016, revenues from sales of digital tracks and albums declined faster than in any previous year. Overall digital download revenues were \$1.8 billion, down 22% versus 2015. Individual track sales revenue was down 24%, and digital album revenue was down 20% compared with the previous year. Revenues from sales of digital albums were 49% of the download total, their highest share ever ... The industry showed another increase, albeit from levels that remain well below their peak in the late 1990’s. The growth of streaming

¹ <http://www.nielsen.com/us/en/insights/reports/2015/music-360-2015-highlights.html>

² Spotify, the leading interactive streaming service, has over 30 million pieces of music in its repertoire. SoundCloud claims a repertoire of 125 million songs

³ The Phoenix Center for Advanced Legal and Economic Public Policy Studies, *Safe Harbors and the Evolution of Music Retailing*, Policy Bulletin No. 41, March 2017.

⁴ Joshua P. Freidlander, *News and Notes on 2016 RIAA Shipment and Revenue Statistics*, RIAA.

music and prevalence of digital platforms show that music consumption is higher than ever – which is great for fans. But challenges remain significant as physical shipments and digital downloads, two of the industry’s three major revenue sources, continued to decline in 2016. A similar evolution is observed in other countries.

However, U.S. radio listening hours in 2016 is still accounted for mostly by traditional radio, Hertzian (79%) and Satellite (8%), while webcaster Pandora is coming at 10%. Regarding U.S. music streaming hours, Pandora leads with 55% followed by Spotify at 32%.⁵ On a worldwide scale, Pandora and Spotify appear neck to neck. As a whole, music represents 79% of audio listening time.⁶ And 61% of Americans say that they discover music through radio (AM/FM and Satellite) compared to 27% for online audio or video streaming websites/apps.⁷

Interlocking financial arrangements are also developing. Major music labels appear to be holding minority stockholder positions in Spotify, namely Sony BMG (5.8%), Universal Music (4.8%), Warner Music (3.8%), and Merlin.⁸ Moreover, it was announced on June 9 2017 that SiriusXM invested US\$ 480 million for a 19% stake in Pandora and obtained three seats on its board of directors.⁹ Those are the most recent among other cross ownership deals that existed in the recent past and exist today.

Those financial deals in a sense blur the lines between different business models in the music delivery industry and it is not clear how they will impact the intensity of competition among the different (digital) technologies and models as well as the copyright royalties. But one thing is clear: unless rightsholders remain on their toes and avoid the risky position of residual claimants in the development of the digital age, they will end up on the losing side of history.

Since musical works and sound recordings are information goods or assets, the determination of relevant tariffs rests not so much on the cost of creation, which is underlying the supply function of new works and new sound recordings, but rather on the value of such goods for the users.¹⁰ We thus need a rigorous basis for ascertaining the value of copyrights, that is, the competitive market value of copyright in copyrighted works or assets.

Section 1. The Search for Value: Hertzian Radio

The terrestrial (Hertzian) radio industry has many characteristics that make it suitable to derive or infer the objective market-based value of music copyrights. It is a mature industry

⁵ Pandora Analyst Day, October 25 2016.

⁶ Edison Research, *Share of Music – A Share of Ear Report*, Q2 2016. Besides music at 79%, we find news at 9%, talk/personalities at 9%, and sports at 3%.

⁷ Nielsen Music 360 Report, 2015.

⁸ As reported by Swedish Wire, July 4 2017.

⁹ Janko Roettgers, “Why the SiriusXM Investment in Pandora is a Win-Win Situation”, *Variety*, June 9 2017.

¹⁰ The Canadian Copyright Board recognized, in its 2002 Pay Audio Decision, that: “in information industries, pricing tends to be based on the value to the buyer, not on cost to produce.”

with good business data, hence can be analyzed without too many restrictive or outside a priori assumptions. Indeed, we will see that the available data, potentially obtained under court order, allow us to derive the competitive market value of music in Hertzian radio (HR).¹¹

Once this value is obtained, one can proceed to determine the competitive market value in Internet non-interactive radio (IR) on the basis of the level playing field principle, that is, on the basis that competition between these two forms of radio, competing for listeners, be engaged on equal terms insofar as the price of music, their critical input, is concerned. We can then extend the analysis to steaming interactive services by using a market proxy for interactivity from the music downloads market.

What is the business of a commercial radio station? We can assume that the objective of a commercial radio broadcaster is to maximize profits or station value by capturing a particular niche audience to be sold to interested advertisers. The broadcaster achieves this by offering a combination of music and talk (hosts, DJs, and other on-air personalities) of a particular genre.¹² The crucial decisions are then: what genre of music and talk to broadcast and how to split the program time between music M and talk T , given the choices made by competitors.

For profits to be maximized, it must be the case that at the margin, the last minute of talk and the last minute of music brings the same net advertising revenue, that is, have the same marginal contribution to profit or station value; otherwise, the operator would change the program mix to get a higher level of profits. Station profit or station value maximization requires that the per-minute marginal value be the same for music and talk. Let us say that happens for the program time split (M^* , T^*), expressed in minutes or percentages of available program time. This implies an *implicit* competitive market price per minute P , the same for both music and talk, that is, if this price or cost per minute of music and talk was in effect, the broadcaster would choose the program mix (M^* , T^*).

Observing the program mix (M^* , T^*) chosen by the broadcaster and the compensation of talk PT^* , available from the accounting data of the radio station, one obtains an implicit competitive market per minute price P equal to the total compensation of talk divided by the number of minutes of talk T^* . The competitive market compensation of music can then be obtained as $PT^*(M^*/T^*) = PM^*$. Hence, the competitive market value of music is revealed by

¹¹ This section is based on two publications. The first one is Paul Audley and Marcel Boyer (2007), "The 'Competitive' Value of Music to Commercial Radio Stations," *Review of Economic Research on Copyright Issues* 4(1), December 2007, 29-50 [reprinted in Audhi Narayana Vavili (ed.), *Music Copyrights: A Legal Wrangle*, Amicus Books, 2009; translated in Spanish "El valor competitivo de la musica para las estaciones de radiocomerciales", In Watt, R. (Ed.), *Teoría econónmica y derechos de autor* (205-244). Datautor, Madrid (2011); and extensively reviewed in the PriceWaterhouseCoopers (Australia) Report, *Valuing the use recorded music*, July 2008. The second publication is Marcel Boyer (2015), *The Value of Copyrights in Recorded Music: Terrestrial Radio and Beyond*, Commentary #419, C.D. Howe Institute, Toronto, February 2015.

¹² Talk represents more rigorously the non-music content of programming time. Elements excluded from programming time would cover news, advertising, and station identification for instance.

or inferred from the behavior and choices of the commercial radio broadcaster or broadcasters. Hence the following basic proposition:

The competitive market values/compensations of music and talk are necessarily proportional to their “shares” of broadcast time.

The above proposition or theorem has NOT been obtained from a heuristic or historical approach and it is NOT an opinion, a belief, or a value judgement. It follows from (i) the assumption of profit or station value maximization and (ii) two elements of information or observable elements, namely the chosen program mix (M^* , T^*) and the competitive compensation of talk expressed as PT^* determined on a competitive market and willingly paid by the broadcaster.

An important caveat.

It may be useful to recall an important caveat here. Competitive markets compensate inputs at their marginal values, not at their total values for the firm (buyer), here the broadcaster: hence, competitive market values of music and talk will be as usual potentially much lower than their respective total values for the broadcaster. Hence, talk may be “more important” than music (in terms of total value) for radio broadcasters even if or when the competitive market compensation of music is larger than that of talk. There is no direct or simple link between the respective total values of music and talk for broadcasters and their competitive market values. If the distinction is well known to economists, it remains a significant source of confusion and errors among non-economists, even at times among economists themselves. An example of that confusion is the often heard statement in the radio business that talk is much more important for broadcasters than music is and that although radio may use more music than talk, on-air talent both as a cost and as a drawing card is far more important. I will discuss further this important caveat below, in appendix 2 of this section.

An illustrative application based on Canadian data

Canada’s *Copyright Act* is jointly administered by two federal departments—Industry Canada and Canadian Heritage. The *Act* was proclaimed in 1921 and substantially amended in 1988, 1997 and 2012 (the *Copyright Modernization Act*). The Canadian copyright system recognizes two main rights, the communication right and the reproduction right, and two main groups of rightsholders, the authors, composers and music publishers (group 1) and the performing artists and sound recording makers (group 2). Copyright royalties for musical works and sound recordings are mainly determined through public hearings by the Canadian Copyright Board (CCB), which, in the absence of an agreement between the parties, is asked by rightsholders and/or broadcasters to set royalty rates for blanket licenses to reproduce and broadcast copyrighted musical works and sound recordings. Blanket licenses significantly reduce transaction costs. The CCB ascertains the competitive value of copyright in commercial Hertzian radio after hearing arguments from the disputing parties, including

direct and cross examination of expert witnesses. In so doing, it may also rely on proxies and benchmarks, as well as agreements between related or similar parties. In a sense, the Board acts as a surrogate for competitive markets in striking an equilibrium between the interests of rights holders as willing sellers and the interests of users as willing buyers without market power being exercised on either side.

The communication rights of authors and composers (music publishers) are managed by SOCAN, the Society of Composers, Authors and Music Publishers of Canada. The communication rights of performers and makers (record labels) are managed by Re:Sound (formerly known as the Neighbouring Rights Collective of Canada). The reproduction rights of authors and composers (music publishers) are managed by CSI Music Services, a joint venture of CMRRA, the Canadian Musical Reproduction Rights Agency, and SODRAC, the Society for Reproduction Rights of Authors, Composers and Publishers in Canada. Finally, the reproduction rights of performers and makers (record labels) are managed by CONNECT Music Licensing (formerly known as Audio-Video Licensing Agency) and SOPROQ, the Société de gestion collective des droits des producteurs de phonogrammes et vidéogrammes du Québec. Hence, copyrights in recorded music fall into four different baskets. In each basket, one finds a right and one of the rightsholders' groups. Given the particular features of national copyright laws and regulations and given the particular industry considered, some of those baskets may be empty, which may have an impact on the total royalty payments. The sharing of total royalty payments is an important issue by itself, but my concern here is the determination of the aggregate competitive value, not its distribution across the different baskets.

The *Copyright Act* contains some exceptions to favour dissemination of some copyrighted works, to curb excessive market power by rights holders, to recognize freedom of expression and to recognize that original works always build on previous works. One exception is known as fair dealing. It says that using copyrighted works for the purposes of research, private study, education, parody or satire, as well as criticism and review and news reporting, may not infringe copyright if certain conditions are satisfied.¹³ Such admissible uses of authors' or creators' intellectual property do not require authorization and do not give a right to royalty compensation. To avoid unintended harm and to foster efficient means of exchange between users and creators of copyrighted works, while respecting the rights of both, fair dealing must involve a balanced approach in accordance with the conditions and factors of use stipulated by the Supreme Court of Canada.¹⁴

¹³ Those conditions have been established by the Supreme Court of Canada in decisions such as: *CCH Canadian Ltd. v. Law Society of Upper Canada*, 2004 SCC 13, [2004] 1 S.C.R. 339; *Alberta (Education) v. Canadian Copyright Licensing Agency (Access Copyright)*, 2012 SCC 37; *Society of Composers, Authors and Music Publishers of Canada v. Bell Canada*, 2012 SCC 36, [2012] 2 S.C.R. 326.

¹⁴ For a theoretical economic discussion of those factors in light of the principles of balance and respect for the rights of all concerned, along with the principles of efficiency as put forward by the Supreme Court of Canada,

To illustrate further the power of the above arguably simple model and analysis developed above, let us consider the data from the Canadian commercial HR industry.

Total advertising revenues of the Canadian commercial terrestrial radio industry reaches some 1.6 billion C\$ in 2015. The figures are rounded out. The total music royalties payable by the industry, at the nominal (before deductions) rate of 11.15% of revenues amounts to 180 million C\$; after different deductions are applied, this amount falls to 100 million C\$ or 6% of revenues.¹⁵

The data to implement the above analysis is readily available from CRTC, Statistics Canada, and the financial reports of the HR operators (some data may need to be obtained through court order). As showed above, we need two pieces of information: the share of programming time allocated to music by HR operators and the programming costs per minute of non-music content.

Based on data obtained in the course of hearings before the Copyright Board of Canada in 2004,¹⁶ Audley and Boyer (2007) obtained that Talk received about 18.8% of total revenues, which would amount today to about 300 million C\$. They also obtained that music represents on an advertising-weighted average basis at least 60% of program time, hence that $(M^*, T^*) = (60\%, 40\%)$. Applying the theorem above, the competitive market value of Music amounts to $18.8(60/40) = 28\%$ of revenues, or $300(60/40) = 450$ million C\$ today.¹⁷ That amount would be larger if we were to consider a larger percentage share of music in program time. For instance, if we were using Globerman (2007)'s shares (70%, 30%), we would obtain $18.8(70/30) = 44\%$ of revenues or $300(70/30) = 700$ million C\$ for the competitive market value of music.

We saw above that the total royalties paid by the commercial radio industry in Canada amounts to about 100 million C\$. Hence the question: where is the missing 350 million C\$? We know already that some 80 million C\$ are due to different forms of deductions and exceptions, financed by rightsholders to the benefit of users, broadcasters, and other

see Marcel Boyer (2012), "The Economics of Fair Use/Dealing: Copyright Protection in a Fair and Efficient Way", *Review of Economic Research on Copyright Issues* 9(1), 2012, 3-46., available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2101080##.

¹⁵ In Canada, music royalties are paid by commercial HR stations as a percentage of advertising revenues (total revenues). Hence, the marginal cost of broadcasting more minutes of music is literally zero as the percentage of revenues appear as a fixed cost of music input. In other words, a station broadcasting music 45% of program time and another station broadcasting music 65% of program time, both with similar advertising revenues, would pay the same amount in music royalties.

¹⁶ Paul Audley and Marcel Boyer (2007), referenced in footnote 11 above, is an updated version of Paul Audley, Marcel Boyer and Stephen Stohn (2004), "The Value of Performers' Performances and Sound Recordings to Commercial Radio Stations," a report filed on behalf of NRCC, now Re:Sound, as NRCC-7 for the 2004 commercial radio hearings, Copyright Board of Canada.

¹⁷ This is inclusive of HR cost of the music programming that is not related to royalties (about 1.9% of revenues).

stakeholders. Hence the net amount missing and unaccounted for is today of the order of 270 million C\$. If music is mispriced as it appears to be, then its missing value is, as usual in such cases in any industry and for any input, captured by other stakeholders.

Who are the stakeholders in the value created by the commercial HR industry? We can regroup those into five different groups. First, the music content providers, that is, authors, composers, songwriters, music publishers, artists, performers, makers of sound recordings, and record labels. Second, the talk content providers, that is, hosts, DJs, and other on-air personalities. Third, other inputs such as the owners, operators, managers, capital providers, workers, employees, materials and equipment suppliers, etc. Fourth, the advertisers who buy from the broadcasters the access to audiences of particular interest. And finally, the end consumers as listeners and their governments as their collective representatives. If this list of stakeholders is reasonably complete, they must collectively account of the value created but not captured by rightsholders, although it is not clear which stakeholders capture what shares of the missing competitive value of music.

The identification of those stakeholders and their respective shares in the capture of music value remains an open question.

Appendix 1 to Section 1: The Audley-Boyer Model

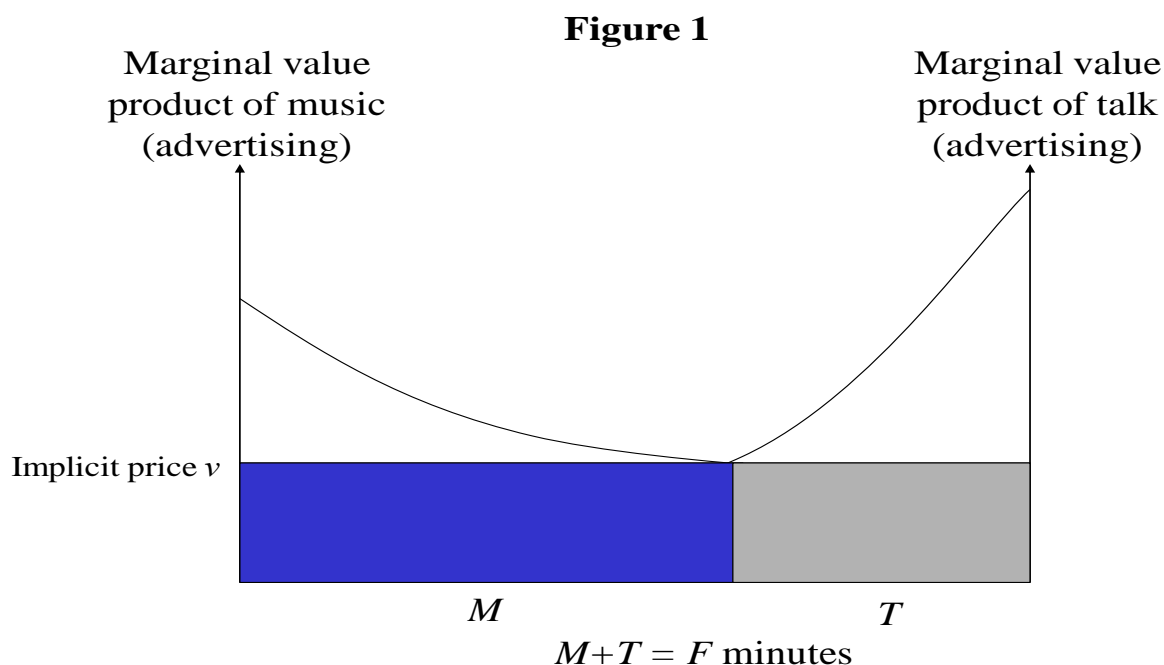
The following Figure 1¹⁸ illustrates the model and results. If a terrestrial radio operator chooses (see Figure 1) an (M, T) allocation of program time between music M and talk T , it must be because this allocation is expected to maximize the profits of the station. Given an available F minutes of program content, the marginal value product (mvp) of music content measured in minutes from left to right in Figure 1 is decreasing and the marginal value product of talk content measured in minutes from right to left is also decreasing. The profit maximizing program time allocation is reached at the intersecting point where $mvp(M) = mvp(T)$, with $M + T = F$. The last minute of each type of content generates the same marginal advertising revenue.

The closest proxy to the marginal values of music content and talk content is the marginal, not the total, contribution of each to advertising revenues: the equal marginal contribution at the intersection of the two mvp curves is the implicit competitive per-minute market price of both music and talk. Indeed, confronted with that single and common per-minute price of music and talk, the profit maximizing terrestrial radio operator would choose the amount of music M and the amount of talk T which equate their respective marginal value product.

The competitive market payments for music and talk, based on their common marginal contribution, are proportional to their respective program time. Those payments appear as the blue or dark-shaded rectangle and the grey or light-shaded rectangle in Figure 1. This proportionality is not an assumption made or an opinion expressed by outside analysts or

¹⁸ The Figure is imported from the papers referenced in footnote 11 above.

experts – technologists, lawyers, judges, or economists – but a direct implication of the profit maximizing choices and decisions of the terrestrial radio operators themselves.



It is important to stress at this point that the (M, T) allocation is chosen by the terrestrial radio operator on the basis of his/her knowledge of the $mvp(M)$ and $mvp(T)$ curves. The outside observers, such as economists, lawyers or judges, can observe the (M, T) allocation but not the curves themselves. Although one can affirm that the chosen (M, T) allocation must be profit maximizing, one cannot say how much music and talk do in fact contribute to the station's profits either absolutely or relatively.¹⁹

The Audley-Boyer estimate of (M^*, T^*) is an advertising-price (rate card) weighted share of music and talk across different parts of the day. The following self-explanatory tables present the data.

¹⁹ The total contribution of music and talk to profits would be measured by the integral of the mvp curves (surface under the curves). But given that one does not observe those curves, one cannot determine that value. However, the operator has, at least implicitly, such knowledge.

TABLE 1
Breakdown of Program Content: Sample Stations, 2003-2004
 (% of broadcast hours devoted to program content – by day part and all day)

Day Part	Program Type	Program Content Breakdown
6:00 a.m.-9:00 a.m.	Sound recordings	63.5%
	Other programming	36.5%
9:00 a.m.-3:00 p.m.	Sound recordings	77.8%
	Other programming	22.2%
Noon - 1:00 p.m.	Sound recordings	70.5%
	Other programming	29.5%
3:00 p.m. - 4:00 p.m.	Sound recordings	83.5%
	Other programming	16.6%
4:00 p.m. - 6:00 p.m.	Sound recordings	77.7%
	Other programming	22.3%
6:00 p.m. - 7:00 p.m.	Sound recordings	76.6%
	Other programming	23.4%
7:00 p.m. - Midnight	Sound recordings	79.2%
	Other programming	20.8%
All Day	Sound recordings	76.1%
	Other programming	23.9%

Source: Erin Research (2004)

TABLE 2
Percentage Breakdown of Broadcast Hours
Including and Excluding Commercials
6:00 a.m. – Midnight, 2003-2004

Type of Broadcast	% of broadcast hours excluding commercials	% of all broadcast hours including commercials
Sound recordings	73.7	67.3
Newscasts	5.9	5.4
Other programming	17.3	15.8
Station IDs/Promos	3.1	2.8
Commercials	-	8.7
<i>Total</i>	100.0	100.0

Source: Erin Research (2004)

TABLE 3
Aggregate Hours per Week of Listening to Commercial Radio Stations

	Hours of Listening (000s)				% of Listening hours				
Day Part	1990	1995	2000	2002	1990	1995	2000	2002	4-year average
6 a.m. - 9 a.m.	87,626	92,828	92,083	90,710	22.22%	21.13%	21.55%	20.97%	21.47%
9 a.m. - 3 p.m.	167,086	192,352	185,619	189,495	42.37%	43.78%	43.45%	43.82%	43.36%
3 p.m. - 7 p.m.	87,133	99,026	99,267	101,504	22.10%	22.54%	23.24%	23.47%	22.84%
7 p.m.- midnight	52,477	55,146	50,256	50,764	13.31%	12.55%	11.76%	11.74%	12.34%
TOTAL	394,322	439,352	427,225	432,472	100.0%	100.0%	100.0%	100.0%	100.0%

Source: BBM Survey, Statistics Canada

TABLE 4

**Estimate of Share of Listening to Program Content on Music Stations
Accounted for by Sound Recordings**

Day Part	% of Listener Hours	Sound Recordings as % of Program Content	Weighted Share of Program Listening
6:00 a.m. – 9:00 a.m.	21.47	63.5	13.6
9:00 a.m. – 3:00 p.m.	43.36	77.8	33.7
3:00 p.m. – 7:00 p.m.	22.84	78.8	18.0
7:00 p.m. – Midnight	12.34	79.2	9.8
<i>Total</i> 6:00 a.m. - Midnight	100.0	76.1	75.1

TABLE 5

**Distribution of Commercials Compared to Distribution of Listening Hours
by Day Part**

Day Part	Hours of Commercial Broadcast Time/week	Commercial s as % of Broadcast time During Day Part	% of All Commercial Time/Week	% of Total Listening Hours/Week During Day Part
6:00 a.m. – 9:00 a.m.	2.42	11.5%	22.0%	21.47%
9:00 a.m. – 3:00 p.m.	3.84	9.1%	34.9%	43.36%
3:00 p.m. – 7:00 p.m.	2.52	9.0%	22.9%	22.84%
7:00 p.m. – Midnight	2.22	6.4%	20.2%	12.34%
TOTAL	11.00	8.7%	100.00	100.00%

TABLE 6**Estimate of Percentage of Commercial Revenue Generated by Each Day Part**

day part	% of hours in each day part	% of commercial time in each day part	Average commercial rate for day part (based on index of 1.00 for 6-9 am)	Estimated contribution of each day part to commercial revenue
6:00 a.m. – 9:00 a.m.	16.7	22.0	1.00	25.9%
9:00 a.m. – 3:00 p.m.	33.3	34.9	.86	35.4%
3:00 p.m. – 7:00 p.m.	22.2	22.9	.86	23.2%
7:00 p.m. – Midnight	27.8	20.2	.65	15.4%
Total 6:00 a.m. –Midnight	100.0%	100.0%		100.0%

TABLE 7

**Breakdown of Content of an Average Hour of Broadcast Time
During the 6:00 a.m. to 9:00 a.m. Period and From 9:00 a.m. to Midnight**

	6:00 a.m. to 9:00 a.m.	9:00 a.m. to Midnight
Sound Recordings	32.8 minutes	41.9 minutes
Newscasts	7.8 minutes	2.3 minutes
Other Programming	11.1 minutes	9.1 minutes
Station IDs/ Promos	1.4 minutes	1.8 minutes
Commercials	6.9 minutes	4.9 minutes
Total	60.0 minutes	60.0 minutes

Source: Erin Research study.

TABLE 8
Value Attributed to Sound Recordings and Other Program Content
by Day Part, Weighted According to Commercial Value

Day Part	% of Commercial Value	Program Content Value Attributed to Sound Recordings	Value Attributed to Other Program Content
6:00 a.m. – 9:00 a.m.	25.9%	12.95% (1/2)	12.95% (1/2)
9:00 a.m. Midnight	74.1%	49.40% (2/3)	24.70% (1/3)
TOTAL	100.0%	62.35% 60%	37.65% 40%

Because the Audley-Boyer estimate of (M*, T*) is an advertising-rate weighted share of music and talk across different parts of the day, it is not directly comparable to (but in a sense more rigorous than) other estimates of the shares of music and talk in programming that are presented on the basis of absolute minutes of broadcasting. Those estimates would include the following obtained through different methodologies applied to different periods, different contexts, and different samples: (70%, 30%) in Globerman (2007)²⁰; (81%, 19%) in Erin Research (2008)²¹; (81%, 19%) in Copyright Board of Canada (2014)²²; (67%, 33%) in Touve (2015)²³.

Appendix 2 to Section 1: The 2005/2008 Commercial Radio Decision of the CCB²⁴

Following the 2004 commercial radio hearings, the Canadian Copyright Board (CCB) rendered an important decision in 2005, which raised by 32% the royalty rate for the use by

²⁰ Steven Globerman (2007), “Determining the Appropriate Increase in SOCAN Tariff Payable for the Public Performance of Musical Works,” a report filed on behalf of the Canadian Association of Broadcasters (CAB-6) for the 2007 commercial radio hearings, Copyright Board of Canada

²¹ Erin Research (2008), “The Use of Music on Commercial Radio, 2008 Sounds Recordings as Feature Content on Music Stations”, a report filed on behalf of CSI (CSI-03.L), for the 2008-2009 commercial radio hearings, Copyright Board of Canada

²² Copyright Board of Canada (2014) Decision on “Re:Sound Tariff 8 – Non-interactive and semi-interactive webcasts, 2009-2012.”

²³ David Touve (2015), “\$0.0000955: The value of a Spin, per Listener, to Songwriters on US Radio in 2014”, <https://rockonomic.com/0-0000955-the-value-of-a-spin-per-listener-to-songwriters-on-us-radio-in-2014-bb232821d46f> Touve writes: “Estimating the number of songs played per hour on US Radio appears to be a mix of Art and Science.”

²⁴ Although this is a specific Canadian case, the lessons learned and the principles it puts forward are of general interest for the world of copyright.

commercial radio stations of the communication rights of musical works and sound recordings from 3.2% to 4.2% of revenues.

In that decision, the Board rejected the Audley-Boyer model²⁵ and results in the following terms:

“The model is complex, but that in and of itself is not a reason to reject it. It also represents a valid and interesting attempt at evaluating the contribution of music as an input for broadcasters, something which is difficult at the best of times. In theory, then, it could prove helpful in estimating the value of music, something the Board is always striving for in setting tariffs.

“In practice, however, the model suffers from significant flaws, both in the manner in which it arrives at an overall value for the relevant rights and in the manner in which it allocates that value amongst rights holders.

“The model is inherently imprecise because it is based on a series of unproven assumptions. For example, music occupies 63.5 per cent of air-time between 6:00 a.m. and 9:00 a.m. The model then posits that its use brings in half the revenues generated during that period. That figure is unsupported in fact. The model also assumes that the right to reproduce a performance and the right to reproduce a sound recording each are worth the same as the right to reproduce a musical work, but offers little to support that assumption.

“More importantly, the model is highly volatile. Small changes in the share of revenues that music is thought to bring in leads to large variations in the rate. Having concluded that music brings in 60 per cent of a station’s revenues, NRCC arrives at a combined rate of 19.5 per cent. If music brought in 55 per cent of revenues, the rate would be 15.6 per cent, which is one-fifth less; if it brought in 65 per cent, the rate would be 24.5 per cent, which is one-quarter more. Such a highly unstable model cannot be useful because of the uncertainty it would create.

“Had the Board opted to use the NRCC model, it would have applied at least one significant correction. The model assumes that a minute of music brings in about half the revenues that a minute of spoken word contents generates. In the Board’s view, this does not sufficiently recognize the fact that on-air talent is by its nature exclusive and as such, commands a significant premium. The ratio that the Board would have applied probably would have brought the final rates within the range of those that the Board sets later in this decision” (CCB 2005 decision, pages 15-17).

It is not useful to discuss here the CCB’s appreciation of the Audley-Boyer model because, although this appreciation is at times if not always improper or incorrect, it can be excused because of both the complexity and somewhat inadequate wording of the original

²⁵ Or the Audley-Boyer-Stohn model, as the original version was known at the time. See footnote 14 above.

presentation. The discussion can be more efficiently conducted through the CCB's 2008 re-examination decision.

The 2005 decision rocked the radio broadcasting industry and was appealed by the Canadian Association of Broadcasters. The Federal Court of Appeal judgment asked the Board to reconsider its 2005 decision and make its underlying arguments and reasons more explicit. Following new hearings, the CCB rendered a new decision in 2008, which reaffirmed its 2005 decision to raise significantly the royalty rate.

In its 2008 decision, the CBB relied in part on a model proposed by the Canadian Association of Broadcasters (the Globerman report) with some minor modifications and adjustments. To be coherent with the Board's decision, I am using an analytical framework that is consistent with Professor Globerman's framework. But, in so doing, I will introduce significant changes to avoid what may be called the *CCB-Globerman Fallacy*.

It is not an easy matter to identify the proper price or compensation of music given the very particular characteristics of the commercial radio industry, the basis on which that industry has access to sound recording content, and the resulting absence of a market process for determining the price of use. However, the objective must be to find a price that would ensure that operators of music radio stations are properly and equitably compensated, that is, a price that would ensure that the risk-adjusted rate of return on capital (RAROC) is competitive and that at the same time the authors/composers, performers and makers are properly and equitably compensated.

To properly assess the argument, I need to go back to the 2008 Commercial Radio decision, reaffirming the previous 2005 decision.

Professor Globerman cleverly associates the repertoire acquired by radio station operators from the relevant copyright holders with the acquisition of an asset.²⁶ The Board stated that "The CAB provided us with a broad economic approach to assess the global value of music" [B52]²⁷; and affirmed that "Professor Globerman ... uses an approach that estimates the overall value of music for radio broadcasters. He assumes that the value of music is equal to the price that would be paid by radio broadcasters for music in a competitive market. In such a market, this price will tend to correspond to the incremental revenue derived from the

²⁶ In fact, the radio station operators acquire an access to the asset represented by the Collectives' repertoires. Hence, one could relate royalties to an access price, as suggested by David R. Strickler (2015), "Rate Setting for Sound Recordings by the United States Copyright Royalty Board: The Judicial Need for Independent Scholarly Economic Analysis," *Review of Economic Research on Copyright Issues* 12(1/2), 1-15. Although Judge Strickler argues in favour of the Baumol-Willig access pricing formula, the case of copyright might more closely be amenable to the Laffont-Tirole Global Price Cap formula. See Marcel Boyer and Jacques Robert (1998), "Competition and Access in Electricity Markets: ECPR, Global Price Cap and Auctions", pp. 47-74 in G. Zaccour (ed.), *Deregulation of Electric Utilities*, Kluwer Academic Pub.

²⁷ In this Appendix 2 to Section 1, I use [Bnn] to refer to paragraph nn of the CCB 2008 decision. Similarly I use [Gnn] to refer to paragraph nn of Professor Globerman's report.

music, or the value of marginal productivity of music. This in turn can be measured by multiplying the average productivity of music by the price paid by advertisers per hour of music audience” [B55]. The Board summarized the approach in the following terms: “Professor Globerman contends that the value of music to the broadcaster is the product of three main variables: the average productivity of music, the net revenue per hour of music audience and the hours of music broadcast” [B57].

However, the three main variables in Professor Globerman’s model, namely, the average productivity of music, the net revenue per hour of music audience, and the hours of music broadcast, must be carefully measured to derive the competitive value of music. The Board’s account of the measures proposed by Professor Globerman reads as follows: “The average productivity of music is defined as the proportion of total number of hours of music broadcast that is listened to. It is calculated as the ratio of total music listening hours over the total hours of music broadcast. The net revenue per hour of music audience corresponds to the amount of net revenues an hour of listening to the music of a station generates. Professor Globerman calculates this as the difference between total revenues per hour of broadcast and total costs (net of royalties) per hour of music broadcast. The hours of music broadcast measures the total amount of time music is broadcast in a year. The product of the three variables results in the value of music to the broadcasters” [B58]. The Board adds in the same paragraph: “According to Professor Globerman, this measurement of the value of music corresponds to the maximum amount that broadcasters would be ready to pay for the use of music. He defines this as the reservation price” [B58].

Professor Globerman recognizes that “the competitive value of the repertoire cannot be directly calculated from the available data” [G28]. Hence, he does not compute directly the competitive value of music, that is, “the price that would be paid by radio broadcasters for music in a competitive market.” More precisely, the measurement of the three underlying variables, the product of which would give us “the value of music to the broadcaster”, is rather done as index values of their average changes over the period 1997 to 2005. The product of those indexes estimates the change in the reservation price of broadcasters for music, that is, “the maximum amount that broadcasters would be ready to pay for the use of music.” However, there is no reason to consider the starting point itself on which the product those indexes will be applied is an appropriate starting point. As we will see, it is most likely a wrong one.

Strictly speaking, the link between the competitive price and the marginal value of an input is the following: a competitive price results from the interaction of total demand and total supply so that the price appears as given to any participant, buyer and seller; each buyer will choose to buy a quantity such that the marginal value product of the last (additional or marginal) unit of the input is equal to the given competitive price. In that sense, the (given) price of the input and the marginal value of the last unit of the product are equal.

Professor Globerman claims, not without reasons, that “Since one typically does not observe very small changes in the use of an input, it is difficult, as a practical matter, to identify changes in the marginal products of inputs. A practical compromise is to focus on average productivity rather than marginal productivity. Average productivity will be a reasonably close approximation to marginal productivity if marginal productivity is, itself, relatively constant over the range of input use being considered, or if only modest changes occur in marginal productivity as input usage is varied.” [G21]

Here Professor Globerman explicitly makes the very strong assumption that the marginal value of music is equal to the average value: “Recall that the competitive price for a “marginal” unit of music is the average productivity of music (assumed equal to marginal productivity) multiplied by the price paid by advertisers per unit (hour) of music audience denoted as P_{am} . The competitive price for the marginal unit is, in this context, the value of the marginal product of music. Total revenue associated with music broadcasting would therefore equal the value of the marginal product of music multiplied by the total hours of music broadcast by radio broadcasters (H_m). In conjunction with the earlier discussion, it can be inferred that a music repertoire is worth more to a broadcaster: 1. the higher the average productivity of music; 2. the higher the price paid by advertisers per unit of music audience; 3. the greater the number of hours of music that the broadcaster intends to program and broadcast. That is, the broadcasters’ reservation price is positively related to these three factors.” [G25]

Economists know very well the numerous pitfalls and biases that a measurement of marginal values by average values may give rise to. The procedure may be justified as Professor Globerman mentions if marginal values are not observed. He claims that “the price of an input is, in theory, tied to its marginal product, and average product is used as a proxy for marginal product. Average product will be a relatively good proxy when it approximates marginal product which it is likely to do if average product is relatively constant over anticipated hours of use of the repertoire” [G22]. The justifications offered for making those simplifying assumptions are clearly very poor. But in any case, Professor Globerman would agree that it is not appropriate to make the assumptions if marginal values can be observed or can be inferred from the available data.

In the implementation of his model, Professor Globerman relies a lot on simple averages and indexes. In other words, Professor Globerman’s calculations are mathematically correct but do not correspond to his analytical concepts, which the calculations are supposed to measure. Simplicity of calculations is of course a significant plus (Ockham’s razor or *lex parsimoniae*) if it relies on a sound and well established link between the data and calculations and the analytical concepts embedded in the economic model.

However, keeping the essential elements of Professor Globerman’s model and analysis, one can take a different route to estimate directly and more appropriately a better grounded in

economics competitive value of music in the HR industry today. That is in a sense what I did above.

One needs first the relative use of music expressed as a percentage of total air time available for programming and second the total payment or compensation paid for program contents other than music. Both the relative use of music and the compensation of program contents other than music in all HR stations are decisions of the HR operators, not opinions of outside analysts. Given that those decisions are made in each case to maximize the value or profits of the stations, I am able to infer from those choices the competitive value of recorded music to radio broadcasters. In doing so, I take a fresh look at the value of music to commercial radio, not through a somewhat arbitrary measurement of its evolution from some base year (as the Board did in 2005 and 2008) but through a direct measurement based on actual data and observations of HR operators' decisions and behavior.

The relative broadcasting time devoted to music is known from CRTC and Statistics Canada sources, and the total payment or compensation paid for program contents other than music can be obtained from the accounting books of commercial radio stations.

All inputs or factors of production used in generating (advertising) revenues in the commercial radio industry should be properly compensated at their respective "competitive market value" levels. Again, the competitive market value of music, as that of other factors or program contents, corresponds to the marginal value of music, not to its average value and not to its total value for broadcasters. If one input, such as recorded music, were priced below its competitive equilibrium level, then other inputs, such as direct labor and/or capital, could benefit unfairly and inequitably from partially capturing recorded music's mispriced contribution to the value of the commercial radio industry, thereby generating a socially costly misallocation of resources. In a sense, the market equilibrium between willing buyers and willing sellers in the specific market considered here, namely the portfolio of copyrights in musical works and sound recordings, may involve adjustments in related markets for other inputs used in the commercial radio industry, such as capital, labor, and materials. Hence the serious potential pitfalls in simply using historical values (as the Board did in 2005 and 2008), which may have been distorted for many years, even decades.

Total value, average value, marginal value, competitive market value

It is important here to differentiate total value, average value, and marginal value. In a competitive market, the compensation or payment to an input or factor (think of music, or on-air talent, or even electricians) does not equal the value of that input in the production process, that is, its value for users/buyers. If the (given) price of a unit of the input considered is p , the buyer-operator will use that input up to the point (total quantity used, say Q) where its marginal product value - or simply marginal value - is equal to the price p . Hence the total payment is pQ , an amount typically much lower than the total value of the input in the production process.

In fact, there is only a very weak link between total value (and average value which is total value divided by Q) and marginal value. Two inputs may have the same marginal value (e.g. if their price per unit is the same) but very different total values for the buyer, here the HR operator. Hence, music and some other program content may have the same implicit marginal value per minute or per play, but very different total and average values per minute or per play.

In its 2002 decision in the case of DPA services, the Board claims “... *although music may be what radio mostly provides, that does not mean that it is radio’s most important input. The most important part of programming is not necessarily what consumes the most airtime: sports are crucially important to a television station’s profitability, but generally represent a fairly small share of overall programming. Radio may be designed around the use of music and musical genres but as a cost, and (probably) as a drawing card, on-air talent is far more important. Commercial Radio could reduce its expenses significantly by dispensing with on-air talent and making greater use of SOCAN’s and NRCC’s repertoires. If it does not, it must be because radio broadcasters consider that the lost advertising revenues would be greater than the cost savings. On-air talent creates the crucial identity link between station and audience*” [page 10].

The Board clearly refer in the above statement, which has been repeated many times since 2002, to the total values of music and on-air talent, not to their respective marginal values or competitive market values. The claim by the Board that “*as a cost, and (probably) as a drawing card, on-air talent is far more important*” may be true or false but, assuming it is true, it does not contradict the proposition that music would or should receive a total competitive compensation X% higher than on-air talent if indeed the marginal (not total) value of music and the marginal (not total) value of on-air talent are the same while music is used X% more than on-air talent as a share of program time.

Indeed, two important caveats must be repeated again and again as they are often forgotten. First, competitive markets compensate inputs on the basis of their marginal values not on the basis of their total values in the production process. Second, talk may be “more important” than music (in terms of total value) to radio broadcasters even if or when the competitive compensation of music is larger. Lots of paradoxes (and analytical errors) flow from forgetting or neglecting these otherwise and nevertheless remarkable results.

While the price of music is not known in the absence of a competitive market, the relative use of music is known and easily measured. Economic analysis provides the missing direct link between on the one hand the measurable relative use of recorded music and other program contents in HR and on the other hand the implicit price of recorded music, not because of some mathematical formula but because this relative use is optimally chosen by HR operators to maximize the value or profits of their respective station. It is because of the factors and forces underlying the decisions of HR operators that the relative use of music and other program contents reveals so much about the competitive market value of music.

The link between music use and its marginal value, hence its competitive price or market value, can be ascertained without loss of generality through five descriptive or economic facts and one simplifying, but without loss of generality, assumption, which are all compatible with the thrust of Professor Globberman's analysis:

- a. Fact #1: a commercial radio operator uses program content inputs, say talk or on-air talent and music, to generate an audience that is then "sold" to advertisers to generate maximal revenues;
- b. Fact #2: a commercial radio operator aims to maximize the value or profits of his/her station by optimally allocating the limited program time available in different parts of the day between different program contents, say on-air talent and music;
- c. Fact #3: to attain the profit maximizing allocation of program time between the different program contents, it must be true that the marginal (or additional, or incremental) minute of each program content is equal across all program contents because otherwise, it would be possible and desirable to reallocate the program time from the lower marginal value content to the higher marginal value content in such a way that the profit of the station is increased;
- d. Fact #4: the payments made for program contents other than music is readily observable in HR accounting books;
- e. Assumption #1: the marginal minute of music and other program contents can be programmed at a marginal out-of-pocket cost of zero;
- f. Fact #5: although its marginal cost is assumed to be zero, the opportunity cost of a marginal minute of music and other program contents is positive.

From the perspective of an outside observer of HR broadcasting, the marginal out-of-pocket cost of an additional unit of music, say an additional minute of music, is zero as the payment of royalties is not directly tied to the use of music but rather paid as a percentage of revenues: two stations with the same level of revenues but using different amounts of music would pay the same amounts in royalties. And similarly for other program content such as talk for which contracts with on-air personalities are set on the basis of broad characteristics rather than on a per-minute basis. There is therefore no direct link between music use and royalties paid even if music is a generator of revenue and revenue is a generator of royalties.

But the "true" cost of an additional or marginal unit or minute of music is not zero since, given the limited program time available (e.g. fixed at N minutes per hour), it must come at the expense of an equivalent reduction in other program contents. In economics jargon, this is the opportunity cost of the marginal unit of music broadcast: to play one more minute of music, the HR operator must renounce one minute of other program content, say one minute of on-air talent. Sometimes, it is difficult to measure a cost directly while the opportunity cost,

based on the value of the renounced alternative, is more easily obtained. This concept of opportunity cost is arguably one of the central and most important concepts in economics.

For simplification, assume that all revenues come from advertising and that there are only two types of program content, namely “music” and “talk or on-air talent”. Let us assume also that the typical relevant part of the day lasts, for example, three hours and that the allocation of airtime between the different program contents in a given part of the day is done by one-minute increments. To simplify the argument, I will assume that the additional (or marginal) costs to commercial radio operators of a one-minute increment in music content and of a one-minute increment in talk content are both equal to zero since the total payment for royalties is typically set as a *percentage* of revenues and the payment for talk content is typically set on a contract basis with a zero marginal cost within a range of content time.

The total number of minutes of program content in a given part of the day is total broadcast time minus all other items such as station promotion, station identification, advertising, etc. Let us assume for now, to simplify the analysis, that 100 minutes are available on average for program content in a three hour period. The goal of a HR operator is to find the proportion of the 100 minutes to be devoted respectively to music and talk in order to yield the highest value or profit. HR operators will alter the relative allocation of time between music and talk if it is profitable to do so. For example, a broadcaster will devote one additional minute to music, and consequently one less minute to talk (opportunity cost), if the additional advertising revenue associated with the additional music programming, that is, the value of the marginal product of music, offsets any loss of advertising revenue due to the reduction in talk content time, that is, the value of the marginal product of talk.

As in Professor Globerman’s analysis, the value of the marginal product of an input “is essentially the increment to revenue that the buyer anticipates from the acquisition and use of an incremental unit of the input to produce output holding the use of other factors of production constant. In a competitive market, the price of an input would equal the value of its marginal product” [G4]. In responding to the market forces created in the advertising market, broadcasters will settle on a particular allocation of time between music and talk such that there is no opportunity to increase revenues by reallocating minutes between music and talk: the allocation of program time chosen by the HR operator must be such that the value of the marginal product of music and the value of the marginal product of talk are equal to each other, say to v .

This result can be compared to what would happen if the market for recorded music and talk contents were competitive markets. As Professor Globerman states: “The value of an input to a potential buyer purchasing that input in a competitive market is determined by the value of the input’s marginal product” [G4]. In a competitive market, the HR operator would face prices for recorded music content and talk content, as determined by market forces. Advertising rates for airtime would also be determined by market forces. To maximize the profit or value of the firm, the broadcaster would allocate the available time between music

and talk so that the last minute of each type of content generates the same *net* advertising revenue. That is, the additional profit (additional advertising revenue less the additional cost) would be identical for the last minute of music and the last minute of talk at the allocation chosen by the broadcaster. If the HR operator could increase profitability by increasing the amount of time devoted to music relative to talk, the operator would do so. Similarly, if the HR operator could increase profitability by increasing the amount of time devoted to talk relative to music, the operator would do so. Consequently, the relative amount of time devoted to music and the relative amount of time devoted to talk must be such that their marginal contributions to profits (hence net of marginal costs, if any) are exactly equal.

The value of the marginal product of music and the value of the marginal product of talk must be equal if the HR operator is indeed maximizing the value or profits of the station.

Remember, I am talking of marginal values of music and talk, not of total values or average values; as we saw, even if the marginal values of music and talk must be the same, their total or average values to the HR operator will normally differ, possibly by a large margin. Hence, if the market price per minute of music and the price per minute of talk were both equal to v (defined above), the HR operator would choose the value maximizing allocation of programming time between music and talk, in such a way that the value of the marginal product of music (measured in minutes) would be equal to the market price of music v and the value of the marginal product of talk (measured in minutes) would be equal to the market price of talk v and hence both would be equal as expected.

In the absence of a market for recorded music, the closest surrogate to the *implicit* per-minute price or marginal value product of music content and talk content is the additional or marginal contribution of each to advertising revenues. Given my simplifying but not limiting assumption that the additional cash or out-of-pocket cost of a minute of music and a minute of talk are equal to zero, the additional per-minute contribution of each to advertising revenues must be equal. The tariff rate that approximates the implicit competitive market price for music must therefore be such that the *payments* for the two program contents, music and talk, are *proportional* to their respective numbers of minutes of programming.

As mentioned before, the total contributions to advertising revenues of each type of content (as distinct from the contributions made by the last minute of each type of content) would be potentially much larger than the additional contributions of the last or marginal minute of each program content times the number of minutes of each type of content. The difference serves as in any other context or industry to cover other expenses as well as the cost of capital, that is, the competitive return on the capital invested (the RAROC).

The above analysis does not mean that the pricing (royalty payment) of recorded music is or should be done on a per-minute basis. We know that it is not and should not be. In fact, there are good reasons why the payments to copyright holders should be made as a percentage of revenues for a blanket license, hence at an effective marginal price equal to zero. The main

reason is that the short run marginal cost of using additional minutes of recorded music is indeed zero.

But the *implicit* competitive price revealed by the observed behavior and decisions of HR operators remains nevertheless positive and can be used to determine the royalty payments of the HR industry to music copyright holders as the competitive value of music to the HR industry. Again, the total value of music to the CR industry is potentially much larger than its competitive value. And again, competitive markets price goods and services and compensate inputs on the basis of their marginal values not of their total values (the basis of the well-known paradox of water and diamond).

Moreover, the competitive royalty payments corresponding to the competitive value of music to the HR industry is arguably much lower than the HR operators' total willingness-to-pay for the music they use, which would correspond to the total value of music for CR, that is, their reservation price for such music use. As Professor Globerman puts it: "... if the Copyright Board wishes to be guided by the workings of competitive markets in its decisions regarding an appropriate tariff, the distinction between a competitive price and the maximum price that buyers would willingly pay should be kept in mind" [G10].

To conclude, the proper interpretation and development of Professor Globerman's analytical framework leads us to the same conclusion as the one presented above: The competitive market value of music corresponds to 28% of revenues of commercial radio stations.

Section 2. The Search for Value: Satellite Radio

As the terrestrial/Hertzian radio industry, the satellite radio industry has many characteristics that make it suitable to derive or infer the competitive market value of music copyrights. It is a well-developed and established industry with good business data, hence can be analyzed without too many restrictive or outside a priori assumptions. We will see that the available public data allow us to derive a competitive market value of music properly grounded in economics.

What is the business of a satellite radio (SR) provider? We can assume that the objective of a SR provider is to maximize profits or business value by attracting subscribers to its ad-free service and capturing a particular niche audience on its ad-based service to be sold to interested advertisers. The provider achieves this by offering a combination of different genre of music, talk and music-talk stations, with talk comprising hosts, DJs, and other on-air personalities. The crucial decisions are then: the portfolio of genre-specific stations to offer and the specific mix of music and talk to provide on each of those stations in order to attract ad-free subscribers and ad-based audiences.

For profits to be maximized, the SR provider must evaluate how much subscribing and advertising revenues is generated by the program inputs used, namely music, talk and others. It must be the case that at the margin, talk and music used bring similar revenues, that is, have

the same marginal contribution to profit or business value; otherwise, the SR provider would change the portfolio of genre-specific stations and the program station mix or mixes to get a higher level of profits.

The relevant fundamental proposition from economic theory is that the marginal value of a factor or input is equal to its (marginal) capacity expressed in terms of the additional quantity produced (here the number of additional subscribers/listeners attracted) times the value for the SR provider of those additional subscribers/listeners, that is, the revenue the SR provider can generate from its subscribers/listeners.

In other words, the observed quantity of music used by the SR provider together with its capacity to attract subscribers/listeners as well as the value of those additional subscribers/listeners for the firm, all data typically known to the firm, will reveal the competitive market value of music. Indeed, if the competitive market price of a unit of music were given by or set at the value of those additional subscribers/listeners for the firm (the marginal value product of music), the firm would buy or provide the quantity of music it is providing or using. In that sense, the marginal value product of music is its competitive market value. Hence,

***The competitive market values/compensations/prices
of music and other inputs in satellite radio are necessarily proportional
to their relative capacities to attract subscribers/listeners.***

Again, the above proposition or theorem has NOT been obtained from a heuristic or historical approach and it is not an opinion, a belief, or a value judgement. It follows from (i) the assumption of profit or service value maximization and (ii) the relative capacities of different contents or inputs to generate additional net revenues (their relative marginal value products). The chosen combination of inputs must satisfy the above proposition.

It may be useful to recall again the two caveats mentioned above, which applies here too. First, competitive markets compensate inputs or contents at their marginal values, not at their total values for the firm (buyer), here the SR provider: hence, competitive market values of music and talk observed in SR will be as usual potentially much lower than their respective total values for the SR provider. Second, the competitive compensation of music may be larger than the competitive compensation of talk, even if or when talk content is “more important” than music in terms of total value to the SR provider.

An illustrative application based on US SiriusXM data.

SiriusXM offers “a dynamic programming lineup of commercial-free music plus sports, entertainment, comedy, talk, news, traffic and weather, including: an extensive selection of music genres, ranging from rock, pop and hip-hop to country, dance, jazz, Latin and classical; live play-by-play sports from major leagues and colleges; a multitude of talk and entertainment channels for a variety of audiences; a wide range of national, international and

financial news; exclusive limited run channels; and local traffic and weather reports for 21 metropolitan markets throughout the United States” (Annual Report, page 2).

From the 2015 annual Report (SEC 10-K filing) of SiriusXM,²⁸ we learn that it offers over 175 audio channels (72 ad-free, 15 news & issues, 11+ sports, 9 traffic & weather, 22 talk & entertainment, 18 Latin, 9 comedy, 14+ other), which subscribers/listeners can package in different ways. Its total revenues for 2015 reached US\$4.57 billion, of which 84% are due to subscribers, 2.7% are due to advertising, and 13.3% are composed of revenue and royalties from the sale of satellite radios, components and accessories and “amounts earned from subscribers for the U.S. Music Royalty Fee, revenue from our connected vehicle business and our Canadian affiliate and ancillary revenues.”²⁹ Total royalties reached 10% of total revenues in 2015 (9% in 2013, 11% in 2017) or US\$457 million, with the number of subscribers reaching 29.6 million.

Available data from SiriusXM will allow us to determine the competitive market value of music in satellite radio. To do this, we will first consider the nature of the contract SiriusXM signed with its main talk attraction namely host Howard Stern. We will be able to determine what the profitability of this host is for SiriusXM and how this profitability is linked to its compensation. We will then apply the same methodology to determine the value of music to SiriusXM. The data come from the 2006 hearings before the US Copyright Royalty Board and in particular from the October 2006 Report filed by Michael Pelcovits on behalf of SoundExchange.³⁰

The market price the SDARS would pay for sound recordings should be consistent with the market prices paid for other content. Dr. Pelcovits’ analysis of the prices the SDARS pay for

²⁸ “SiriusXM is an American broadcasting company that provides three satellite radio and online radio services operating in the United States: Sirius Satellite Radio, XM Satellite Radio, and SiriusXM Radio. The company also has a major investment in Canada called SiriusXM Canada, an affiliate company that provides Sirius and XM service in Canada. At the end of 2013, Sirius reorganized their corporate structure, which made SiriusXM Radio Inc. a direct, wholly owned subsidiary of SiriusXM Holdings, Inc. SiriusXM Radio was formed after the U.S. Federal Communications Commission (FCC) approved the acquisition of XM Satellite Radio Holding, Inc. by Sirius Satellite Radio, Inc. on July 29, 2008, 17 months after the companies first proposed the merger. The merger brought the combined companies a total of more than 18.5 million subscribers based on current subscriber numbers on the date of merging. The deal was valued at \$3.3 billion, not including debt. Through Q3 2016, SiriusXM has 31 million subscribers.”

²⁹ We learn from SiriusXM website that “Music royalty rights were established by Congress and are the product of the Copyright Act. Unlike terrestrial radio, SiriusXM is required to pay copyright music royalties to recording artists, musicians and record labels that hold copyrights in sound recordings (the actual recording of a work) that were fixed after February 15, 1972. Like terrestrial radio, SiriusXM must also pay music publishers who hold copyrights in musical compositions (or the lyrics and music) through their collective organizations, such as ASCAP and BMI. The U.S. Music Royalty Fee funds existing and anticipated royalties payable by SiriusXM to composers, publishers, recording artists, musicians and record labels that hold copyrights in musical works and sound recordings.”

³⁰ Testimony of Michael Pelcovits *In the Matter of Adjustment of Rates and Terms for Preexisting Subscription Services and Satellite Digital Audio Radio Services* (Docket No. 2006-1 CRB DSTRA), October 2006.

other content suggests that a comparable return to sound recording rights holders would be 24.5% of SDARS' total revenues. Dr. Pelcovits uses one well-defined example of non-music content, about which there is the most information available in the public domain: the amount SiriusXM paid for the right to carry Howard Stern's programming. The amount SiriusXM paid for Howard Stern and for other content on a per-customer-acquired basis ought to equal the amount SiriusXM would pay for sound recordings on a per-customer-acquired basis.

SiriusXM paid Howard Stern approximately \$415 million in net present discounted value for the rights to carry Stern's programming for five years. Financial analysts, some of them briefed on the Stern transaction by SiriusXM, generally put the number of incremental customers Sirius expected to gain from Howard Stern's programming at less than 1.75 million net customers. Hence, SiriusXM paid \$237 per subscriber to Stern for the incremental subscribers (\$415 million divided by 1.75 million subscribers).

Using a 42 month average life for the typical SiriusXM listeners, Dr. Pelcovits calculates that SiriusXM paid Stern about \$5.64 per month for each incremental subscriber (\$237 divided by 42). Sirius is expected to generate \$10.25 per subscriber per month in 2006, rising to \$11.65 in 2010 (the last year of Stern's contract). SiriusXM paid Stern from 48% ($\$5.64/\11.65) to 55% ($\$5.64/\10.25) of revenue generated from each subscriber that his programming attracted to SiriusXM. That makes an average of slightly above 50% of revenue.

We learn from the testimony of Yoram Wind (October 2006) on the survey he conducted on SDARS subscribers³¹ that 41% of subscribers to SDARS would drop the services if there were NO music and 15% more would be willing to pay an average reduced price of 7.27\$ per month, that is 44% less than the regular price of 12.95\$ per month. If SDARS were to drop their price to 7.27\$ per month for all 59% of subscribers still on board, revenues would drop by 67% ($41\% + 59\% \times 44\%$). If SDARS maintained their price at 12.95\$ per month, then 56% ($41\% + 15\%$) of customers would drop the service and revenues would therefore drop by 56%. Hence the second alternative would be better and therefore, one can conclude that music generate 56% of subscribers to SDARS or in others words that SDARS would lose 56% of subscribers if no music were offered.

If music content were to receive 50% of the revenue for the 56% of those customers attracted to the SDARS by music, it would receive 28% ($50\% \times 56\%$) of the revenue associated with all of the SDARS' customers. In other words, based on what SiriusXM paid for Howard Stern's programming, one would expect music content to receive, in a similar marketplace transaction, approximately 28% of revenue for use of its licenses.

³¹ Testimony of Yoram (Jerry) Wind *In the Matter of Adjustment of Rates and Terms for Preexisting Subscription Services and Satellite Digital Audio Radio Services* (Docket No. 2006-1 CRB DSTRA), October 2006 (Appendix K, Figures 1 and 2).

In sum, if SiriusXM paid the sound recording owners an amount comparable to what it paid Howard Stern in an open marketplace transaction, it would pay approximately 24.5% of revenues to SoundExchange and another 3.5% to music publishers. With revenues of US\$4.57 billion in 2015, this would represent US\$1.28 billion in royalties. Given that SiriusXM paid 10% of revenues (US CRB PSS-SDARS decision 2012) in royalties that year, the missing value due to rightsholders amounts to US\$823 million in 2015.

Where is that missing value? As argued above, if music is mispriced as it appears to be in SR, then its missing value is, as usual in such cases in any industry and for any input, captured by other stakeholders.

Who are the stakeholders in the value created by the SR industry? As in the commercial HR industry, we can regroup those into five different groups: the music content providers, the talk content providers, the owners, operators, managers, capital providers, workers, employees, materials and equipment suppliers, etc., the advertisers, and the end consumers as subscribers/listeners and their governments as their collective representatives. Those stakeholders collectively account of the value created by but not captured by rightsholders, but again it is not clear who captures what share of the missing competitive market value of music.

Section 3. The Search for Value: Interactive Music Streaming Services

The interactive music streaming services industry has characteristics that make it suitable to derive or infer the objective market-based value of music copyrights. It is an unregulated industry with sophisticated buyers and sellers of licenses for accessing musical works and sound recordings and with good business data, hence can be analyzed without too many restrictive or outside a priori assumptions. This industry is in a sense simpler than commercial HR industry and the SR industry because there is only one content namely music, but that simpler structure may make it more difficult to infer the competitive market value of music from market data in the interactive music streaming services industry. We will show that it is nevertheless possible to do so.

What is the business of an interactive music streaming service? We can assume that the objective of an interactive music streaming service provider is to maximize profits or the service value by attracting subscribers. The provider achieves this by offering a freemium service, that is, basic features are free with advertisements, while additional features plus improved streaming quality and offline music downloads are available with paid subscriptions giving access to a large repertoire of sound recordings embedding musical works with significant flexibility left to subscribers to choose his or her preferred musical works and artists.

The crucial challenges are then to negotiate with music labels the acquisition of the largest possible repertoire at the lowest possible cost and to price its services given the characteristics of other offerings of music on the market. Given that an interactive music streaming service is

simply repackaging/reselling music, sound recordings embedding musical works, the revealed competitive market value of music is directly obtained through the financial data of the service provider, the service production function being quite simple.

The competitive market value/compensation/price of music in the interactive music streaming services industry is the arm's length negotiated per-play rate, which includes a premium for interactivity.

The above proposition or theorem rests on the relatively competitive negotiation process in place between major sophisticated players or agents on both sides of the transaction namely the interactive music streaming services and the music labels and other rightsholders' representatives. The proposition has not been obtained from a heuristic or historical approach and it is not an opinion, a belief, or a value judgement.

An illustrative application based on business and financial data from Spotify and Pandora.

Overall, Spotify negotiates licenses/contracts with record labels and media companies to use their repertoire and make it available to its customers/listeners. The payments made by Spotify may be considered "competitive" given its specificities in the OMS industry and the presence of active and sophisticated competitors on both sides of the transactions. Let us consider the data from Spotify and compare them with data from the semi-interactive music streaming service Pandora.

Spotify is primarily an interactive streaming service present worldwide. It has 90 million active global users as of December 2015, of which 31.5% are subscribers responsible for 90% of revenues.³² Other listeners are on the free but constrained and ad-based service. Spotify has about 20 billion listening hours per year or 300 billion plays per year and its annual revenues are €1.95 billion in 2015 with an 80% growth rate between 2015 and 2014 after a 45% growth rate between 2014 and 2013.

Spotify incurred in 2015 content acquisition costs of €1.63 billion or 83.6% of its revenues. Content acquisition costs are almost totally royalties and are function of the country of sales, the number and percentage of subscribers, the relative country premium pricing and exchange rate, the country laws and regulations on copyrights. This represents an 85% growth rate between 2015 and 2014 after a 46% growth rate between 2014 and 2013.

Hence the per-play rate paid by Spotify in 2015 is €0.0054 (or US\$0.006) per play.

Pandora³³ is primarily a semi-interactive streaming service mainly present in the U.S. It has some 81 million active users in December 2016, of which 4.4 million are subscribers (5.4% of

³² Data on Spotify obtained from *Music Business Worldwide* (Tom Ingham, May 23 2016), based on Spotify's financial filing in Luxembourg uncovered by MBW, as reported at: <https://www.musicbusinessworldwide.com/spotify-revenues-topped-2bn-last-year-as-losses-hit-194m/>

³³ Pandora, U.S. SEC 10-K filing for 2016 <http://investor.pandora.com/Cache/38090352.pdf>

users).³⁴ Pandora claims 20 billion listener-hours.³⁵ It is interesting to note that the total radio listening hours in the U.S. in 2016 is split as follows: HR 79%; Pandora 10%; SR 8%; others 3%. Of the total music streaming hours in the U.S. in 2016, 55% were on Pandora, 32% on Spotify, 8% on iHeart, and 5% on other platforms; on a worldwide basis, Pandora and Spotify have about the same number of listening hours. Pandora's annual revenues reached US\$1.385 billion in 2016 and its content acquisition costs (royalties) reached US\$734.4 million or 53% of revenues.

Hence the royalty rate paid by Pandora in 2016 is US\$0.00245 per play.

To compare the per play rate of Pandora and Spotify, we must account for the value of interactivity or selectivity that is present on Spotify but much less on Pandora. Using data from the music downloads delivery platforms, we can estimate that the value of selectivity, measured as the price for downloading one single track from an album relative to the per track price for downloading the whole album, is 1.92.³⁶ Hence, the equivalent non-interactive or semi-interactive per play rate of the interactive per play rate paid by Spotify can be estimated as $\text{US\$}0.006/1.92 = \text{US\$}0.003125$, about 28% more than Pandora's per play rate paid in 2016.

This indicates that if Spotify per play rate paid in 2015 corresponds to the competitive market value of music on interactive music streaming services, then the Pandora per play rate should be 28% higher than it is in 2016, that is, Pandora royalties are too low by US\$202 million in 2016. In other words, the competitive market value of music on Pandora is about US\$936 million compared to royalties effectively paid of US\$734 million.

This undervaluation of music on Pandora semi-interactive streaming service is most probably due to the regulatory institutional framework that rules royalty fixing and directly influences and determines Pandora per play rate, while it influences only indirectly Spotify per play rate. Again, if music is mispriced as it appears to be on Pandora, then its missing value is, as usual in such cases in any industry and for any input, captured by other stakeholders, including the owners, operators, managers, capital providers, workers, employees, materials and equipment suppliers, etc., the advertisers, and the end consumers as subscribers/listeners and their governments as their collective representatives.

³⁴ Those users have created some 7 billion stations on Pandora since 2005 (each subscriber can create 100 stations) versus less than 4000 terrestrial radio stations in the U.S.

³⁵ About the same as total listener-hours to music-format radio stations in Canada, of which recorded music account for 65.7%.

³⁶ See Marcel Boyer, Joel Blit and Paul Audley (2013), "The Value of the Use of the CSI Repertoire by Online Music Services," a report filed as Exhibit CSI-3 in the case CSI Online Music Services (2011-2013), SOCAN Tariff 22.A – Online Music Services (2011-2013), SODRAC Tariff 6 – Online Music Services, Music Videos (2010-2013), Copyright Board of Canada.

Section 4. The Three Legged Stool of Music Value

The proper value of music and the ensuing fair compensation of creators correspond to what would be paid on well-functioning competitive markets. In a general context with multiple parties as buyers and sellers, a *competitive equilibrium* is a situation in which economic forces are balanced with a stable resting point suitable for both willing buyers (demand) and willing sellers (supply).

When considering whether or not to use a good, buyers would compare the (marginal) utility or value derived from the use of the good to the market price and buy only if such value is larger than its price. Similarly, the sellers would compare the (marginal) cost of producing and making the good to the market price and agree to produce and sell only if such cost is less than or equal to the price.

Therefore, a price that corresponds to a competitive market price or a properly negotiated price would necessarily account for balance between creators' interests and users' interests since any investments, costs, risks, and derived benefits would be incorporated in the demand and supply functions and would thus be reflected in the resulting competitive market or negotiated price. Given this price, the buying party is deriving maximal value from using the good or input and the selling party is properly and fairly compensated for its costs, each party being free to accept the transaction.

However, as mentioned above, musical works are different from standard goods like apples or cars; they are information goods. Information goods have the particularity that they can be consumed simultaneously by multiple users without depleting the quality or quantity of the good available to any of them.³⁷ In the context of musical works, negotiations are typically conducted between parties, implicitly or explicitly. Thus, a properly negotiated price between sophisticated and symmetric parties is analogous to a competitive equilibrium price.

Differences in cost structures, namely cost of entry and cost of audience reach, favor different royalty formulas in different industries although those industries compete with each other up to a certain point for listeners' ears.

In HR industry, costs of entry (broadcasting spectrum license) and fixed costs of audience reach (broadcasting equipment) are relatively high while marginal costs of audience reach are relatively low, even zero. This favors a percentage of revenues formula. In music streaming or webcasting services industry, costs of entry are relatively low while fixed and marginal costs of audience reach (bandwidth costs) are relatively high and increasing with audience size. This favors a per play rate formula. Hence, a royalty formula expressed as a percentage of

³⁷ Despite this particularity, the same fundamental principles apply. However, two possibilities arise: either users pay the same price regardless of the value they derived from the work or users pay some proportion to the (marginal) value they derive from the good. The latter case, which takes into account is referred to as Lindahl pricing.

revenues is socially efficient for HR and SR and a royalty formula expressed as a per play rate is socially efficient for interactive and semi-interactive music streaming or webcasting services.

A percentage of revenues formula means that the marginal cost of music use by terrestrial or satellite radio providers is zero since two radio stations using the same amount of music but generating different revenues would pay different royalties while two stations generating the same revenues but using different amounts of music would pay the same royalties. In a sense, under a percentage of revenues formula, royalties are a “fixed cost” independent of music use. Per play rates in webcasting and music streaming services allow rightsholders to avoid being “residual payees” and favor healthy competition by eliminating uncompetitive webcasters who use huge amount of recorded music with little revenue generating capacity, reducing destructive competition intensity (Bertrand trap), and inducing webcasters, as resellers of recorded music, to develop value added features such as the interactivity (Spotify) or genomic features (Pandora).

In Sections 1, 2 and 3, we derived the competitive market value of copyrights in music from three different industries and three different methodologies, defining the three legged stool of music value.

We showed in Section 1 that for commercial terrestrial/Hertzian radio, the relative competitive market values of music and talk are necessarily proportional to their respective shares of program time. In the Canadian context this value is equal to 28% of revenues. And it is socially efficient that royalties be expressed as a percentage of revenues.

We showed in Section 2 that for satellite radio, the relative competitive market values of music and talk are necessarily proportional to their relative capacities to attract subscribers. In the case of US SR (SiriusXM), this value is equal also to 28% of revenues. And it is socially efficient that royalties be expressed as a percentage of revenues.

We showed in Section 3 that for interactive online music streaming services, the competitive market value of music corresponds to the unregulated and negotiated per-play rate paid by interactive music streaming services, including and adjusted for the value of interactivity. In the case of interactive music streaming service Spotify, this value is equal to 0.60 US¢/play (or US\$6.00 per 1000 plays). In the case of semi-interactive music streaming service Pandora, this value is equal to 0.31¢/play (or US\$3.13 per 1000 plays). And it is socially efficient that royalties be expressed as a per play rate.

All three value estimates, qualifying as competitive market values, were obtained from observing the behavior and choices of operators / users, not from value judgments, and point to a similar competitive market value!

The competitive values are somewhat similar

Given that the three music distribution technologies (HR, SR and OMS) are competing for listeners' ears, we must make sure that competition takes place on a level playing field. To verify if the above royalty formulas and rates satisfy this requirement, we must translate them into comparable royalty rates and payments.

The competitive market values of music in the Canadian HR industry and in the US SR industry were found to be 28% of revenues.³⁸ Although we do not have the number of plays on satellite radio, we do have a good estimate of that number on Canadian HR radio. Given the number of listeners and the percentage of program time devoted to music on Canadian terrestrial radio, the 28% of revenues corresponds to a per play rate of between 0.235 C¢/play (based on Audley-Boyer 2007) to 0.324 C¢/play (based on the average of five different reports, mentioned in footnote 11 and 20 to 23).³⁹ These per play rates can be directly compared to rates paid by non-interactive or semi-interactive music streaming services. We showed above that semi-interactive service Pandora paid in 2016 a per play rate of 0.245 US¢/play while its competitive market value rate, based on Spotify rate, should be 0.31 US¢/play, which is somewhat of the same order as the competitive market value of music in HR and SR, before adjusting for the exchange rate.

As for interactive music streaming services, the above rates must be adjusted upwards for the value of interactivity (+92% from music downloads⁴⁰), which takes us to a range of 0.451 C¢/play (Audley-Boyer) to 0.607 C¢/play (average of the five different reports). We showed

³⁸ It might be of interest to note that the CCB in its 2002 decision pertaining to Digital Pay Audio services wrote: "As stated earlier, before accounting for the non-eligible repertoire, the lower end of the range within which the Board intends to set the rate is somewhat less than 20 per cent, while the higher end of that range is somewhat more than 30. In the Board's view, the factors that tend to increase the rate are more important than those that tend to decrease it. Under the circumstances, the Board has chosen a starting point of 26 per cent." Moreover, as mentioned above, the CCB write in the same decision: "*The most important part of programming is not necessarily what consumes the most airtime ... Radio may be designed around the use of music and musical genres but as a cost, and (probably) as a drawing card, on-air talent is far more important*" (page 10). This means that in the Board's view, the music content generates far less than 50% of commercial radio revenues. To compare apples with apples, the royalty rate for music in commercial radio when reported as a percentage of revenues generated by music is larger than 11.15%/<50%, that is, larger than 22.3%. If we use 40% instead, we obtain 11.15%/40%, that is, 27.9%. Those are the rates to compare with the DPA rate where 100% of revenues is generated by music.

³⁹ Given that the Canadian HR industry currently pays about 100 million C\$ per year (about 180 million C\$ before deductions) in music royalties, this corresponds to 0.052 C¢/play (Audley-Boyer 60/40) or to 0.044 C¢/play (AVG5 71/29) or to 0.039 C¢/play (Board's 2014 81/19). Therefore, the Canadian HR industry currently pays between 0.039 C¢/play and 0.052 C¢/play.

⁴⁰ See Marcel Boyer, Joel Blit and Paul Audley (2013) referred to in footnote 36 above: "Information provided in the witness statement filed at Exhibit CSI-02 indicates that the average price paid for tracks downloaded as part of bundles was \$0.5975 in 2012, while the average price for individual tracks selected by the consumer was \$1.1474, or 92% higher." There are other estimates of the value of interactivity ranging from 50% upwards.

above that interactive streaming service Spotify paid in 2015 a per play rate of 0.600 US¢/play, which is somewhat of the same order, before adjusting for the exchange rate.⁴¹

The competitive values need not be similar

As mentioned above, different business models in the use and reselling of music means that the competitive market values may differ between delivery technologies. Because of the information good character of music, prices could and in a sense should differ across users. As I write in Boyer (2017),⁴² “with information goods or assets, the problem is somewhat more difficult than for ordinary goods since the same unit (think of a musical work or sound recording) can be listened to and enjoyed many times by many different users or consumers now and in the future as consumption does not destroy or alter the unit in question. The optimal production level will therefore involve the marginal cost and the *sum* of marginal values enjoyed over time by all users: as long as the former is lower than the latter, it will be welfare enhancing to produce the unit in question. And additional units should be produced as long as the sum of marginal values enjoyed over time through multiple uses by multiple users remains above the marginal cost incurred by creators as investors, hence till the point where the two are equal. Meeting such a condition is difficult as it implies, when the sum of marginal values is equal to marginal cost, that marginal values across users will differ.”⁴³ Indeed, the fact that the same unit of an information asset can be used or consumed by many, at the same time or not, means that the good survives consumption: the marginal cost of adding one user or consumer, or for that reason any or almost any number of additional users or consumers can be done at zero cost, almost forever.”

⁴¹ A note on YouTube (Google) may be useful here. According to the RIAA, which represents the major music companies, YouTube pays 0.1 US¢/play in royalties. As Cary Sherman, Chairman and CEO of RIIA, puts it: “it makes no sense that it takes a thousand on-demand streams of a song for creators to earn \$1 on YouTube, while services like Apple and Spotify pay creators \$7 or more for those same streams” (<https://medium.com/@RIAA/2016-a-year-of-progress-for-music-4e9b77022635>). YouTube claims on the other hand that it is advertising-based and therefore more comparable to HR radio than to subscription-based interactive webcasting like Apple Music and Spotify. Recall that the Canadian HR industry pays between 0.039 C¢/play and 0.052 C¢/play, while Apple Music pays about 1.2 US¢/play, Spotify 0.6 US¢/play (although the RIAA claims that Spotify pays closer to 0.7 US¢/play), and Pandora 0.245 US¢/play. The Phoenix Center claims that “Using 2015 data ... a plausible royalty rate increase [on YouTube, based on an average royalty rate between non-interactive streaming and interactive streaming rates] could produce increased royalty revenues in the U.S. of \$650 million to over one billion dollars a year” (The Phoenix Center, *Safe Harbors and the Evolution of Music Retailing*, Policy Bulletin No. 41, March 2017). On safe harbour provisions of DMCA, see <http://www.hypebot.com/hypebot/2017/01/youtubes-safe-harbor.html>

⁴² Marcel Boyer (2017), “The Competitive Market Value of Copyright in Music: A Digital Gordian Knot”, August 31, a slightly revised version of https://www.tse-fr.eu/sites/default/files/TSE/documents/ChaireJJL/PolicyPapers/pp_the_competitive_market_value_of_copyright_in_music_a_digital_gordian_knot_marcel_boyer_july_2017.pdf

⁴³ Achieving the optimality condition through decentralized decision making by individual users would for instance require different prices for different users in order to induce them to consume the proper quantity, each user thereby facing his own particular price (Lindhal equilibrium). The sum of those individualized prices must then be equal to and sufficient to cover the marginal cost of production.

As the CCB wrote in its Digital Pay Audio 2002 decision, “The objectors assert that different business models should not result in different prices, or that different purchasers should not pay different prices for the same input. This is simply incorrect as regards information in general and intellectual property in particular. The whole movie market is premised on the ability to price discriminate. The same is true of performing rights, whose price often is related in part to the importance of music to the activity being carried out. Finally, because of differences in revenue and cost structures, an equivalent price for one type of users may require a higher rate. As commercial radio stations like to point out, an important share of their revenues flow from programming which is not music; this hardly can be said to be an irrelevant circumstance.”

A full treatment would take us too far for the purpose of this paper. Suffice it to mention that the information good character of music and the differences in business models used means that prices of music need not be close to each other across industries to quality as competitive market values.

General Conclusion

The analysis shows that the difference between the competitive market value of copyright in music, both musical works and sound recordings, and the royalties paid by users/operators may be qualified as significant. In the Canadian HR radio industry, the competitive market value of music is 4.5 times larger than the current level of royalty payments: 28% versus 6% of revenues. In the US SR industry (SiriusXM), the competitive market value of music is 2.8 times larger than current royalty payments: 28% of revenues versus 10%. In non-interactive webcasting (Pandora), the competitive market value of music is about 27 % larger than current royalty payments: 0.312 US¢/play versus 0.245 US¢/play. In all these cases, royalty rates are determined by regulatory bodies.

As for the interactive webcasting or music streaming industry (Spotify), it can be considered at the proper level (0.600 US¢/play), given the unregulated negotiation process between Spotify and rightsholders (mainly music labels) in that industry. As shown above, all these estimates of the competitive market value of music copyrights point to a similar ballpark figure, but, as discussed, those values need not be similar. It is however some comforting that they point to market value levels compatible with a level playing field of competition among industries and technologies.

It is important to recall once again that the above estimates of the competitive market value of copyrights in music were obtained neither from a heuristic or historical approach nor from opinions, beliefs, or moral value judgments. They follow from the assumption of profit or business value maximization as the objective of users/operators and observed behavior and choices of users/operators.

This begs the questions: Where are the missing values? If Governments and their royalty-fixing authorities (copyright boards and commissions) design and implement rules,

regulations and exceptions that produce royalty rates significantly below competitive market values, thereby implicitly expropriating part of rightsholders' assets, who should pay for such policies?⁴⁴

One must exert care, prudence and diligence in generalizing the results of Sections 1, 2 and 3 across different jurisdictions and industries as copyright structures differ across jurisdictions. But the methodologies followed to characterize the competitive market value of copyrights in music could be used first to discover and unveil the appropriate data and also to derive credible estimates.

⁴⁴ This question is tackled in Marcel Boyer (2017) referenced to in footnote 42 above.